Abstract

Aim: Define benchmark outcomes in adult liver transplantation

Design: Multicenter retrospective cohort study

Primary outcome measure: Morbidity as defined by the Clavien-Dindo classification for surgical complications and the comprehensive complication index at discharge, 3, 6 and 12 months

Hospital eligibility: High volume centers (> 50 liver transplantation/year), conducting a prospective database as well as previous publications critically reporting on their outcome

Inclusion criteria: Adult patients (>18 years) who underwent brain death cadaveric liver transplantation from 01.01.2010 to 31.12.2014.

Exclusion criteria: Multiorgan transplantations, second recipients in domino transplantations, DCD grafts and split/partial grafts, previous major abdominal surgery, portal vein thrombosis, LabMELD ≥ 30, intubation before transplantation, acute graft failure, super-urgent listing.

Data collection Deadline: August 2016

Introduction

With the growing complexity and costs of modern surgical practice, quality assessment becomes mandatory. The notion of quality and quality assessment is widely recognized and used in the world of business and manufacturing. A possible tool of quality assessment is benchmarking. Benchmarking is a process of measuring performance in order to enable for outcome comparison and improvement within a specific domain. In the surgical community, however, such standard outcome measures and multicenter comparison of results are not available and benchmarking for the best possible results for specific procedures is lacking.

Recently, a first landmark study defining benchmark outcomes for liver resection has been presented at the 2016 ASA meeting in Chicago. (1) Since liver transplantation (LT) is a high-risk procedure associated with high morbidity and 10-20% of 1-year mortality, quality assessment is of major importance. Up to date no data is available on the best achievable results in liver transplant procedures. To identify the best possible outcome i.e. benchmarking, data from high volume centers in low risk patients will be thoroughly analyzed. These benchmark outcomes will serve as <<negative controls >> for comparison with single center outcomes, high-risk patients and future developments.

Policy Securing

Confidential center specific data: No center-specific data will be published. Instead, all complications or adverse outcomes will be anonymously reported, as fractions of the total study population. Each center, of course, will be free to publish their own data, as they wish.

Authorship: No data will be submitted or published without authorization from each participating center. Each center will be represented by two co-authors.

In the ideal case there will be one junior author who will coordinate data collection with Dr. Xavier Muller (coordinator of the study from Zurich). If necessary, three authors may be included for one center in the authorship list.

Further use of cohort data: Future studies based on the collected data will hopefully emerge from this multicenter study e.g. comparing outcomes in re-transplanted patient with the benchmark outcomes.

Methods

Objective:

To conduct a retrospective multicenter cohort study to define benchmark criteria for best achievable outcomes in deceased donor liver transplantation (LT) to serve as negative controls in quality assessment. The benchmark criteria will be derived from postoperative mortality and morbidity as well as graft function and survival.

Aims:

The **primary aim** is to define benchmark outcomes by identifying post LT complications according to the Clavien-Dindo classification for surgical complications (2,3) and the comprehensive complication index CCI (4) at discharge, 3, 6 and 12 months.

The **secondary aims** are:

- One-year patient and graft survival
- Assess graft function according to different criteria (6-10)

Time period:

- The study will cover a 5-year period, from 01.01.2010 to 31.12.2014.

Hospital inclusion criteria

- Single centers performing > 50 liver LT per year
- Centers having a prospective database from which most of the data can be extracted
- All centers are required to have previous publications critically reporting on their outcome

Patient eligibility

Inclusion criteria

- Adult patients (>18 years) who underwent brain death cadaveric liver transplantation.

Exclusion criteria

- LabMELD ≥ 30
- Re-transplantation
- Previous major abdominal surgery[1]
- Complete and partial portal vein thrombosis
- Donation after cardiac death grafts (NHBD)
- Acute liver failure/super-urgent listing
- Intubation at the time of transplant
- Multiorgan transplantation
- Living donor transplantation including second recipients in domino transplantation
- Split or partial grafts

[1]***Note 1**: previous abdominal surgery as exclusion criteria*:

- Only patients who underwent previous upper GI surgery, major lower GI surgery and laparotomy should **be excluded.**
- Patients with laparoscopic appendectomy, pelvic or inguinal surgery (Lichtenstein procedure, hysterectomy...) **should be included**

Note 2: Patients who were transplanted before the study period and are re-transplanted during the study period should be excluded. If patients are re-transplanted during the study period this should be indicated as graft failure. The follow-up after re-transplantation should not be analyzed in this study.

Outcome Measures

Primary outcome measure

The primary outcome measure is identifying post LT complications according to the Clavien-Dindo classification for surgical complications (2,3) and the comprehensive complication index CCI (4) at discharge, 3, 6 and 12 months.

This requires the patient to have a documented post-transplantation follow-up during 12-months in the center conducting the study. Every complication has to be assessed according to the Clavien-Dindo classification. The corresponding CCI will be calculated by the coordinating center in Zurich.

Secondary outcome measures are:

- Assessment of one-year patient and graft survival
- Pre-operative patient characteristics including the MELD score in order to stratify patient according to pre-transplantation risk
- Collection of post-transplantation biochemical data in order to characterize graft function

Governance

Data will be collected via a secure online webpage, provided by the University Hospital of Zurich. This website uses a data entry management system (DEMS) to meet international standards for online databases including fully anonymized data. Data will not be published with hospital identifiers.

Collecting data

Local collaborators: Most hospitals will have two local investigators: **a senior and a junior investigator**. The junior collaborator will be in regular contact with the study coordinator in Zurich. The junior investigator will be responsible for:

- Gaining local research ethics approval
- Identifying and including all eligible patients
- Accurately collect baseline and follow-up data
- Submit data to the online DEMS database

References

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11. Appendix A: Data fields

Note: Day of surgery is defined as post-operative day 0

	Patient ID. Only you will have access to this secure field. If you don't have hospital Ids at your center, enter a identifying number here that you can match to the patient (e.g. 01, 02,)	
	Recipient liver disease	
1	Recipient Age	> 18 years
2	Underlying liver disease	At the time of transplant
3	If hepatocellular carcinoma indicate the largest diameter of the biggest viable tumor lesion	In cm at the time of transplant (after pre-treatment if applies)
4	If multifocal hepatocellular carcinoma, indicate the total number of viable tumor lesions	At the time of transplant (after pre-treatment if applies)
	Recipient pre-transplant	
6	Lab MELD: Model for End stage Liver Disease using the following criteria:	Ranging from 6-40 Important to calculate using the most recent values before transplant including the following
	7a: INR (International Normalized Ratio)	Prior to transplant
	7b: Bilirubin (µmol/l)	Prior to transplant
	7c: Creatinine (µmol/l)	Prior to transplant
	7d: Renal replacement therapy at least twice in the week prior to transplant	Yes/No
7	RRT (renal replacement therapy) during the last 4 weeks before transplant	Yes/No
	Donor characteristics	
8	Donor age	In years
9	Macro-steatosis of the graft	In % as stated by the pathologist on biopsy if not available as estimated by the surgeon during the procedure
	Transplant procedure	
10	Cold ischemia time of the graft	In hours
11	Operation duration	In minutes
12	Number of intraoperative blood transfusions	In numbers of red blood cell units
13	INR (International Normalized Ratio) on postoperative day 5	
14	INR (International Normalized Ratio) on postoperative day 7	

15	INR (International Normalized Ratio) >2 on 3 consecutive days within the first week of surgery	Yes/No
16	Bilirubin on postoperative day 5	In µmol/l
17	Bilirubin on postoperative day 7	In µmol/l
18	Bilirubin > 100 µmol/l (5,9 mg/dl) on 3 consecutive postoperative days during the first week	Yes/No
19	ALT (Alanine aminotransferase) peak during the first postoperative week	In IU/l
20	Creatinine peak within the first 7 post-transplant days	Highest value in µmol/l
21	Renal replacement therapy (RRT) after transplant until discharge	Yes/No
22	If RRT: Duration of post-transplant RTT	In days
23	Encephalopathy grade III or IV on 3 consecutive post op days within the first 7 days of surgery	Grad III: marked confusion, incoherent speech, sleeping most of the time but arousable to vocal stimuli Grade IV: comatose, unresponsive to pain, decorticate or decerebreate posture
	Recipient complications	
24	Bleeding complications	e.g. intra-abdominal bleeding, hematuria…
25	Biliary complications	e.g. stricture, leakage, bilioma…
26	Infection	e.g. wound infection, intra-abdominal infection, pneumonia…
27	Ascites	e.g. paracentesis, hypoalbuminemia…
	Recipient outcome	
28	Length of hospital stay	In days from the date of transplant
29	Length of intensive care unit stay (ICU)	In days
	Recipient complications within the 12 months after transplant	Complications until discharge **excluded**
30	Readmission due to complication	In-hospital stay > 24h within the first 30 days after discharge in direct relation to the cited complication

	Graft function follow up	
31	Graft loss	Death or re-transplantation
32	Cause of graft loss	e.g. arterial thrombosis, acute rejection…
33	Days from transplant to graft loss	In days: From the day of transplant until graft loss
34	Re-transplantation	After graft loss, yes/no
	Recipient follow up	
35	Recipient status at last FU	Death/alive
36	Patient survival in days	If death occurred: how many days after transplantation
37	Creatinine after 1 year	In µmol/l
38	Glomerular Filtration rate after 1 year (GFR)	GFR 1 year after the transplant procedure calculated by the Cockroft-Gault formula